

At a recent meeting of the Wellington Philosophical Society, Mr. J. W. Fortescue spoke of the rapid increase of deer that have been acclimatized in the New Zealand mountains. Having had special facilities for observing these creatures, he proceeded to state some interesting facts as to their habits. At the close of his address Sir James Hector asked Mr. Fortescue, as an expert on the subject, whether the chief use of the antlers was not so much for fighting as for facilitating the progress of the stag through dense woods. He had considerable experience with the wapiti, in North America, and found that by throwing up the head, thereby placing the horns along the back, the animals were enabled to go forward with great rapidity and follow the hinds. He asked this, as it had been stated at a previous meeting of the Society that the antlers tended to entangle the deer. Mr. Fortescue said that Sir James Hector was quite correct in stating that the antlers assisted the stags in penetrating dense forests. Mr. Higginson also bore out this statement from his experience in India.

ON July 23, at 11.17 p.m., a brilliant meteor was seen in the province of Småland, in Sweden. At Nexjö it was seen due east, falling perpendicularly towards the horizon, when it suddenly burst.

DURING the month of June severe frosts occurred in the north of Finland, doing great damage to the crops.

NORWEGIAN hunters returning from the Arctic regions report much ice and severe storms.

ZOOLOGICAL GARDENS are being laid out in Christiania and Helsingfors.

THE additions to the Zoological Society's Gardens during the past week include a Feline Douroucouli (*Nyctipithecus vociferans*) from Savanilla, presented by Master Lester Ralph; a Crested Grebe (*Fodiceps cristatus*), British, presented by Mr. W. Nicholls; a Brazilian Cariama (*Cariama cristata*) from South-East Brazil, presented by Mr. Fredrick Rose, jun.; an Indian Kite (*Milvus govinda*) from India, presented by Mrs. Dean; a Green Turtle (*Chelone viridis*) from the West Indies, presented by Baron Henry de Worms; a Hawk's-billed Turtle (*Chelone imbricata*) from the Bahamas, presented by Mr. W. T. Manger; a Corn Snake (*Coluber guttatus*) from North America, presented by Mr. J. Garnett; a Common Viper (*Vipera berus*), British, presented by Mr. F. C. Smith; a Virginian Fox (*Canis virginianus* ♀) from North America, deposited; a Derbian Screamer (*Chauna derbiana*) from the Northern Coast of Columbia, a Prince Albert's Curassow (*Crax alberti* ♀) from Columbia, four Beautiful Grass-Finches (*Poephila mirabilis*), four Gouldian Grass-Finches (*Poephila gouldiae*) from Australia, purchased; two Rose-coloured Pastors (*Pastor roseus*) from India, received in exchange; two Collared Fruit Bats (*Cynonycteris collaris*), two Mule Deer (*Cariacus macrotis* ♂ & ♀), a Canadian Beaver (*Castor canadensis*), a Thar (*Capra jemlaica*), born in the Gardens; a Brazilian Cariama (*Cariama cristata*), bred in the Gardens.

#### OUR ASTRONOMICAL COLUMN.

VARIABLE STARS.—Mr. Sawyer gives, in Nos. 174 and 176 of *Gould's Astronomical Journal*, the results of his observations of variable stars in the year 1887. The following are the observations for the more regular variables:—

|            |   |         |          |            |         |
|------------|---|---------|----------|------------|---------|
| R Virginis | M | June 17 | Mag. 7.1 | Calculated | June 21 |
| S Coronæ   | M | Apr. 19 | 7.1      |            | Apr. 6  |
| R Lyreæ    | M | Sept. 9 |          |            | Aug. 31 |
|            | M | Oct. 15 |          |            | Oct. 16 |
|            | m | Nov. 10 |          |            | Nov. 16 |
|            | M | Nov. 29 |          |            | Dec. 1  |

The calculated dates are those which have been given in NATURE in the column headed "Astronomical Phenomena." U Monocerotis was observed at maximum on Jan. 15, March 4, April 28;

and at minimum Feb. 18 and April 6; R Scuti was observed at maximum on Oct. 27, and at minimum on Sept. 14 and Nov. 23; W Cygni was at minimum, mag. 6.7, on July 23 and Dec. 8, and at maximum, mag. 6.1, on Sept. 13; Mira Ceti was at maximum, mag. 4.4, on 1886 December 30.

Mr. John Tebbutt reports (*Astr. Nachr.*, No. 2849) that  $\eta$  Argus has undergone a notable increase of brilliancy of late, as he observed it as 7.0 mag. on May 19 of this year; whilst on April 23, 1887, it was only 7.5.

COMET 1888 a (SAWERTHAL).—The following ephemeris for Greenwich midnight for this object is from the *Dun Echt Circular*, No. 157:—

|        | R.A.        | Decl.          | Log $\Delta$ . | Log $r$ .  |
|--------|-------------|----------------|----------------|------------|
|        | h. m. s.    |                |                |            |
| Aug. 3 | ... 1 3 26  | ... 53 51.6 N. | ... 0.3409     | ... 0.3881 |
| 5      | ... 1 2 5   | ... 54 5.5     |                |            |
| 7      | ... 1 0 35  | ... 54 18.3    | ... 0.3424     | ... 0.3973 |
| 9      | ... 0 58 55 | ... 54 30.0    |                |            |
| 11     | ... 0 57 5  | ... 54 40.5    | ... 0.3439     | ... 0.4062 |
| 13     | ... 0 55 5  | ... 54 49.8    |                |            |
| 15     | ... 0 52 57 | ... 54 57.8    | ... 0.3455     | ... 0.4149 |
| 17     | ... 0 50 40 | ... 55 4.4     |                |            |
| 19     | ... 0 48 15 | ... 55 9.7     | ... 0.3471     | ... 0.4234 |
| 21     | ... 0 45 42 | ... 55 13.6    |                |            |
| 23     | ... 0 43 2  | ... 55 16.0 N. | ... 0.3489     | ... 0.4316 |

#### ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 AUGUST 5-11.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

##### At Greenwich on August 5

Sun rises, 4h. 33m.; souths, 12h. 5m. 41.8s.; sets, 19h. 39m.; right asc. on meridian, 9h. 3.6m.; decl. 16° 48' N. Sidereal Time at Sunset, 16h. 38m.  
Moon (New on August 7, 18h.) rises, 1h. 57m.; souths, 10h. 8m.; sets, 18h. 17m.; right asc. on meridian, 7h. 5.8m.; decl. 21° 12' N.

| Planet.    | Rises. | Souths. | Sets. | Right asc. and declination on meridian. |
|------------|--------|---------|-------|-----------------------------------------|
|            | h. m.  | h. m.   | h. m. | h. m.                                   |
| Mercury..  | 2 55   | 10 54   | 18 53 | 7 51.3 ... 20 47 N.                     |
| Venus....  | 5 7    | 12 35   | 20 3  | 9 32.6 ... 16 2 N.                      |
| Mars.....  | 12 37  | 17 21   | 22 5  | 14 19.9 ... 15 17 S.                    |
| Jupiter... | 14 16  | 18 40   | 23 4  | 15 38.6 ... 18 44 S.                    |
| Saturn.... | 4 13   | 11 55   | 19 37 | 8 52.7 ... 18 15 N.                     |
| Uranus...  | 10 16  | 15 54   | 21 32 | 12 52.7 ... 4 58 S.                     |
| Neptune..  | 23 17* | 7 4     | 14 51 | 4 1.3 ... 18 58 N.                      |

\* Indicates that the rising is that of the preceding evening.

| Aug. | h. |                                                                                                                                |
|------|----|--------------------------------------------------------------------------------------------------------------------------------|
| 6    | 9  | Mercury in conjunction with and 0° 18' north of the Moon.                                                                      |
| 7    | 10 | Saturn in conjunction with and 0° 16' south of the Moon.                                                                       |
| 7    | —  | Partial eclipse of Sun: visible as little more than a bare contact at Greenwich, beginning at 18h. 49m. and ending at 19h. 6m. |
| 8    | 9  | Venus in conjunction with and 0° 42' south of the Moon.                                                                        |
| 10   | 23 | Mercury at least distance from the Sun.                                                                                        |

##### Variable Stars.

| Star.           | R.A.        | Decl.        | h. m.           |
|-----------------|-------------|--------------|-----------------|
|                 | h. m.       |              |                 |
| U Cephei        | ... 0 52.4  | ... 81 16 N. | Aug. 9, 19 49 m |
| Algol           | ... 3 0.9   | ... 40 31 N. | ... 5, 20 2 m   |
| U Hydreæ        | ... 10 32.0 | ... 12 48 S. | ... 11, M       |
| $\delta$ Libræ  | ... 14 55.0 | ... 8 4 S.   | ... 9, 23 26 m  |
| U Coronæ        | ... 15 13.6 | ... 32 3 N.  | ... 9, 1 42 m   |
| U Ophiuchi      | ... 17 10.9 | ... 1 20 N.  | ... 9, 1 16 m   |
|                 |             |              | ... 9, 21 24 m  |
| Z Sagittarii    | ... 18 14.8 | ... 18 55 S. | ... 8, 0 0 m    |
| $\beta$ Lyreæ   | ... 18 46.0 | ... 33 14 N. | ... 9, 21 0 M   |
| $\eta$ Aquilæ   | ... 19 46.8 | ... 0 43 N.  | ... 6, 22 0 m   |
| X Cygni         | ... 20 39.0 | ... 35 11 N. | ... 8, 1 0 M    |
| T Aquarii       | ... 20 44.0 | ... 5 34 S.  | ... 5, M        |
| T Vulpeculæ     | ... 20 46.7 | ... 27 50 N. | ... 10, 23 0 M  |
| $\delta$ Cephei | ... 22 25.0 | ... 57 51 N. | ... 9, 20 0 M   |

M signifies maximum; m minimum.

## Meteor-Showers.

R.A. Decl.

|                     |     |                    |                 |
|---------------------|-----|--------------------|-----------------|
| The Perseids ...    | ... | 44 ... 56° N. ...  | Max. August 10. |
|                     |     |                    | Swift; streaks. |
| Near 41 Arietis ... | ... | 44 ... 25° N. ...  | Swift; streaks. |
|                     |     | 96 ... 72° N. ...  | Slow.           |
| Near 0 Cygni ...    | ... | 293 ... 52° N. ... | Rather slow.    |

ON PARTIAL IMPREGNATION.<sup>1</sup>

DURING our researches on the formation of polar-bodies (see NATURE, vol. xxxvi. p. 607) we made the following observations, which are of considerable interest in connection with the theory of sexual reproduction.

As we were able to show that parthenogenetic eggs form only one polar-body, while sexual eggs give rise to two, we looked out principally for those cases in which both kinds of eggs are present in the same species.

On examining the sexual eggs ("Dauereier") of certain species of *Moina*, we found, to our astonishment, that even those which possessed a firm vitelline membrane, and in which four segmental cells were already present, still contained a sperm-cell.

We first of all took this to be a supernumerary spermatozoon which had penetrated into the egg, but it was soon apparent that all eggs of a corresponding stage contained a similar sperm-cell, and that there was always one only. Further observations showed us that we had had here to do with a case of partial impregnation. Only one of the first four segmental cells, and not the entire egg-cell, becomes united with the sperm cell. This is the case, at least, in *Moina paradoxa*. In *Moina rectirostris*, impregnation must occur at a rather later stage, for in this species we have seen eggs in which the first four segmental cells were again ready for division, and still the sperm-cell had not fused with one of them.

In *Moina paradoxa* the process takes place as follows:—Immediately after the extrusion of the egg into the brood-chamber, it is a naked sausage-shaped mass. In this stage, a spermatozoon penetrates into it in the region of the vegetative pole, and then the vitelline membrane becomes formed, and prevents the entrance of a second. The germinal vesicle at the same time becomes transformed into the first polar-spindle, which lies at the surface; the first, and soon afterwards the second polar-body then becomes constricted off, and the nucleus of the ovum, surrounded by protoplasmic particles, migrates to the centre of the egg, which has by this time contracted to the usual form. Now follows the first division of the ovum, which, however, only consists in a separation of these first, or, as we will call them, secondary egg-cells in the centre of the egg;—the two first segmental cells come to lie, as usual, in its longitudinal axis—one, which is always recognizable by the proximity of the polar-bodies, nearing the animal pole, the other the vegetative pole. The sperm-cell always lies in the neighbourhood of the latter, without, however, yet becoming united with it.

Then follows a second division of the segmental cells, together with the separation of the daughter-cells in the transverse direction. There are now four star-shaped daughter-cells present, which lie at an almost equal distance apart, at a right angle with one another. The sperm-cell can be seen near one of the two lower (*hintern*) cells, and it now begins to show amoeboid movements, and to approach the segmental cell, a short narrow bridge of protoplasm being formed, and the two cells beginning to unite with one another. Fusion then follows, and in the next following stage, of eight segmental cells, no sperm-cell can any longer be seen in the eggs.

The uniting of the sperm-cell with the cell- and nuclear-constituents of the egg thus only takes place after the embryonic development has already advanced to the four-celled stage. It would naturally be of great interest to know what eventually becomes of those segments which are concerned in fertilization—that is, which parts of the embryo are formed from them. A very possible supposition is, that only those parts of the egg become fertilized out of which the germ-cells of the young animal will subsequently be formed. This conjecture is rendered by no means improbable by the fact that it is one of the two segmental cells lying at the vegetative pole of the ovum which

becomes fertilized; for it is from these cells, according to Groben's beautiful discovery with regard to the summer eggs of *Moina*, that the germ-cells arise. At a future time we hope to be able to speak more definitely on this point: at present it is only necessary to add that we are studying these processes in other *Daphnide*, and have already observed a similar series of stages in *Sida crystallina* to those above described. But in this case fertilization occurs earlier, in the two-celled stage of segmentation.

Freiburg i/B., December 12, 1887.

P.S.—In the continuation of the above observations another case has presented itself, in which impregnation does not take place until eight segmental cells have been formed. This happens in *Daphnia pulex*. Further details concerning partial impregnation, as well as theoretical support of the facts treated of above, we reserve for a future occasion.

May 21, 1888.

Addendum to the above Note on Partial Impregnation,<sup>1</sup> by Weismann and Ischikawa.

SINCE giving a short abstract of the observations which led us to the conclusion of the existence of partial impregnation, we have continued our researches, and have come to the conclusion that, in spite of the entire accuracy of our facts, we were mistaken as to the explanation of the phenomena described. The fusion with one of the eight first segmental cells does indeed take place regularly, but the uniting cell is not the sperm-cell. The first segmentation nucleus is here, as in all sexual eggs, formed by the fusion of the nucleus of the ovum with the sperm-nucleus, and the fusion of the two cells observed by us at a later stage is something additional to the ordinary impregnation. That this is the case is quite certain: we found the sperm-nucleus and its subsequent fusion with the egg-cell to occur in the same ova in which we could prove the presence of that cell which we at first took to be the sperm-cell.

We can hardly be blamed for this error if it be borne in mind that we found this cell, without exception, in every egg which had just passed into the brood-chamber; that the vitelline membrane was formed directly afterwards; and that, on the other hand, a fusion of this cell with one of the first eight segmental cells lying at the vegetative pole of the egg could be seen in all ova which we possessed of this stage, viz. in five species—two species of *Moina*, two of *Daphnia*, and one of *Polyphemus*. The fact that the form and size of the supposed sperm-cell differ from those of the sperm-cells in the testis of the corresponding species was indeed an objection to our explanation: it has, in fact, almost the same size and shape in all species. But the sperm-cells become altered as soon as they pass into the egg, and it was shown some time ago by Fol and Hertwig, and more recently by Boveri, that the sperm-nucleus grows considerably when within the ovum. Moreover, in one of the species examined (*Polyphemus*), as well as in *Bythotrephes*, the sperm-cell is extraordinarily large, and in both these species we followed the entrance of the enormous amoeboid sperm-cell into the ovum by means of sections, step by step, and were able to convince ourselves of its essential correspondence with the supposed sperm-cell in the eggs of other species. What else could this cell within the ovum be, if it were not the sperm-cell? It was never wanting, and on the other hand there was always one only, so that any idea of its being a parasitic organism was out of the question. Moreover, the two polar cells were always present, so that it could not be mistaken for one of these. And up to the present time no one had ever seen any other cell but the sperm-cell within the ovum.

We should hardly, indeed, have discovered our error so soon, if we had not remembered that one of us had found some years ago that unimpregnated sexual eggs of *Daphnide* soon become disintegrated,<sup>2</sup> and had we not asked ourselves how the embryonic development advanced in such unimpregnated eggs before disintegration begins. For, as we believed that the sperm-cell was only ready for conjugation in impregnated eggs after they had segmented into eight parts, it was to be expected that segmentation would take place up to this stage in unimpregnated ova, and that then only would the disintegration begin. Had we found

<sup>1</sup> Translated from a paper by A. Weismann and C. Ischikawa (*Berichte der Naturforschenden Gesellschaft zu Freiburg i/B.*, Bd. iv., Heft 1, p. 51).—W. N. P.

<sup>2</sup> Translated from the proof of a paper to appear in the *Berichte der Naturforsch. Gesellschaft zu Freiburg i/B.*, Bd. iv., Heft 2, 1888.—W. N. P. "See Weismann, 'Beiträge zur Naturgeschichte der Daphniden,' iv.: 'Ueber den Einfluss der Begattung auf die Erzeugung von Winteriern,' *Zeitsch. f. Wiss. Zool.*, Bd. xxviii. p. 198 et seq.